

# *Gulf Cooperation Council*

## EDICT OF GOVERNMENT

In order to promote public education and public safety, equal justice for all, a better informed citizenry, the rule of law, world trade and world peace, this legal document is hereby made available on a noncommercial basis, as it is the right of all humans to know and speak the laws that govern them.

GSO 67 (1987) (English): INDUSTRIAL SAFETY AND  
HEALTH REGULATIONS - HAZARDOUS MATERIALS - PAINTS  
PART 2: DIPPING PROCESSES USING FLAMMABLE AND  
COMBUSTIBLE MATERIALS



BLANK PAGE



هيئة التقييس لدول مجلس التعاون دول الخليج العربية  
STANDARDIZATION ORGANIZATION FOR G.C.C (GSO)



GSO 67/1987

اشتراطات السلامة والصحة الصناعية

المواد الخطرة - الطلاء

الجزء الثاني : طريقة الغمر باستعمال مواد

قابلة للاشتعال

**INDUSTRIAL SAFETY AND HEALTH REGULATIONS –  
HAZARDOUS MATERIALS – PAINTS -PART 2:  
DIPPING PROCESSES USING FLAMMABLE  
AND COMBUSTIBLE MATERIALS**

**ICS:13.100**

**INDUSTRIAL SAFETY AND HEALTH REGULATIONS –  
HAZARDOUS MATERIALS – PAINTS- PART 2:  
DIPPING PROCESSES USING FLAMMABLE  
AND COMBUSTIBLE MATERIALS**

**Date of GSO Board of Directors Approval : 05-11-1407H (01-07-1987)**  
**Issuing status : Technical Regulation**

**CONTENTS**

1.	SCOPE AND FIELD OF APPLICATION .....	2
2.	COMPLEMENTARY REFERENCES .....	2
3.	DEFINITIONS .....	2
4.	REGULATIONS.....	2
4.1	Ventilation .....	2
4.2	Construction of Dip Tanks.....	3
4.3	Liquid Used in Dip Tanks, Storage and Handling.....	4
4.4	Electrical and Other Sources of Ignition.....	4
4.5	Operations and Maintenance.....	5
4.6	Extinguishment .....	5
4.7	Special Dip Tank Applications .....	6

**INDUSTRIAL SAFETY AND HEALTH REGULATIONS –  
HAZARDOUS MATERIALS – PAINTS PART 2:  
DIPPING PROCESSES USING FLAMMABLE  
AND COMBUSTIBLE MATERIALS**

**1. SCOPE AND FIELD OF APPLICATION**

This Standard is concerned with the flammable and combustible painting materials when used in painting tanks by dipping process. It is applicable to storage and handling of these liquids used in dip tanks, vapour areas and adjacent areas.

**2. COMPLEMENTARY REFERENCES**

- 2.1 GSO 209/1994 “Industrial Safety and Health Regulations - Occupational Health and Environmental Control”
- 2.2 GSO 62/1987 “Industrial Safety and Health Regulations - Flammable and Combustible Liquids - Part 1: Tanks, Piping and Accessories”.
- 2.3 GSO 218/1994 “Industrial Safety and Health Regulations - Electrical - Part 2: Low Voltage”.
- 2.4 GSO 208/1994 “Industrial Safety and Health Regulations - Buildings - Fire Protections”.

**3. DEFINITIONS**

- 3.1 Dip Tanks: A tank, vat, or container of flammable (m combustible liquid in which articles or materials are immersed for the purpose of coating, finishing, treating, or similar processes.
- 3.2 Vapour Area: Any area containing dangerous quantities of flammable vapours in the vicinity of dip tanks, their drainboards or associated drying, conveying, or other equipment, during operation or shutdown periods.

**4. REGULATIONS**

- 4.1 Ventilation
  - 4.1.1 Vapour Area Ventilation

Vapour areas shall be limited to the smallest practical space by maintaining a properly designed system of mechanical ventilation arranged to move air from all directions towards the vapour area origin and hence to a safe outside location. Ventilating systems shall provide for the dilution of vapours and airborne contaminants to a nontoxic, nonflammable and nonexplosive level. Also, airflow will not be directed through any intended work area according to the Gulf Standard mentioned in item 2. 1. Required ventilating systems shall be so

arranged that the failure of any ventilating fan shall automatically stop any dipping conveyor system. See also item 4.2.6.

#### 4.1.2 Ventilation Combined With Drying

When a required ventilating system serves associated drying operations utilizing a heating system which may be a source of ignition, means shall be provided for pre-ventilation before the heating system can be started; the failure of any ventilating fan shall automatically shut down the heating system.

### 4.2 Construction of Dip Tanks

#### 4.2.1 General

Dip Tanks, including drainboards if provided, shall be constructed of noncombustible material, and their supports shall be of metal, reinforced concrete, or masonry. Where dip tanks extend through a floor to the story below or where the weakening of the tank supports by fire may result in the tank collapse, supports shall be of a material having not less than 1-hour fire resistance.

#### 4.2.2 Overflow Pipes

Dip tanks of over 570 litres in capacity or 9.3 sq. m in liquid surface area shall be equipped with a properly trapped overflow pipe leading to a safe location outside buildings. Smaller dip tanks should also be so equipped, where practical. The discharge of the overflow pipe should be so located and arranged that if the entire combustible contents of the dip tank are overflowed through overflow pipe by the application of water during fire fighting, property will not be endangered. The size of the overflow pipe shall be sufficient to conduct the maximum rate of flow of water expected to be applied to the liquid surface of the dip tank from automatic sprinklers or from other sources in the event of fire.

4.2.2.1 Overflow pipes shall be of sufficient capacity to overflow the maximum delivery of dip tank liquid fill pipes but shall not be less than 75 mm in diameter.

4.2.2.2 Piping connections on drains and overflow lines shall be designed so as to permit ready access for inspection and cleaning of the interior.

4.2.2.3 The bottom of the overflow connections shall be not less than 150 mm below the top of the tank. See also items 4.2.6 and 4.6.3.

#### 4.2.3 Bottom Drains

Dip tanks over 1900 litres in liquid capacity shall be equipped with bottom drains automatically and manually arranged to quickly drain the tank in the event of fire, unless the viscosity of the liquid at normal atmospheric temperature makes this impractical. Manual operation shall be from a safely accessible location. Where gravity flow is not practicable, automatic pumps shall be required.

4.2.3.1 Such drain shall be trapped and discharged to a closed properly vented salvage tank or to a safe location outside which will not endanger property.

4.2.3.2 According to tank capacity the diameter of bottom drainpipe shall be not less than the following:

Capacity of Tank Litres	Diameter of Drainpipe mm
1900 to 2850	75
2851 to 3800	100
3801 to 9500	125
9501 to 15000	150
Over 15000	200

#### 4.2.4 Salvage Tanks

The capacity of the salvage tank shall be greater than the capacity of the dip tank or tanks to which they are connected.

#### 4.2.5 Automatic Extinguishing Facilities

Except as noted in item 4.7.1 (applying to hardening and tempering tanks), all dip tanks exceeding 570 litres liquid capacity or having a liquid surface area exceeding 0.4 sq m shall be protected with at least one of the automatic extinguishing facilities conforming to item 4.6.

#### 4.2.6 Conveyor Systems

Dip tanks utilizing a conveyor system shall be so arranged that in the event of fire, the conveyor system shall automatically cease motion and required bottom drains shall open. Conveyor systems shall automatically cease motion unless required ventilation is in full operation. See also item 4. 1. 1.

#### 4.2.7 Heating Dip Tank Liquids

When dip tank liquids are artificially heated, either by the dipping of heated articles, or by other application of heat to the liquid, provision shall be made to prevent a temperature rise greater than 10°C below the flash point of the liquid. See also item 4.7.1.

### 4.3 Liquids Used In Dip Tanks, Storage and Handling

The storage of flammable and combustible liquids in connection with dipping operation shall conform to the requirements of the Gulf Standard mentioned in item 2.2. Where portable containers are used for the replenishment of flammable and combustible liquids, provision shall be made so that both the container and tank be positively grounded and electrically bonded to prevent static electric sparks.

### 4.4 Electrical and Other Sources of Ignition

#### 4.4.1 Vapour Areas

There shall be no open flames, spark producing devices, or heated surfaces having a temperature sufficient to ignite vapours in any vapour area. Except as specifically permitted in item 4.7.3, relating to electrostatic apparatus, electrical wiring and equipment in any vapour area shall be of the explosion proof type



according to the Gulf Standard mentioned in item 2.3 for Class 1, Group D locations.

Unless specifically approved for locations containing both deposits of readily ignitable residues and explosive vapours, there shall be no electrical equipment in the vicinity of dip tanks or associated drainboards or drying operations which are subject to splashing or dripping of dip tank liquids, except wiring in rigid conduit or in threaded boxes or fittings containing no taps, splices, or terminal connections, and except as specifically permitted in item 4.7.3.

#### 4.4.2 Adjacent Areas

In any floorspace outside a vapour area but within 6 m therefrom, and not separated by tight partitions, there shall be no open flames or spark producing devices. Electrical wiring and equipment shall conform to the Gulf standard mentioned in item 2.3.

#### 4.5 Operations and Maintenance

##### 4.5.1 General

Areas in the vicinity of dip tanks shall be kept as clear from combustible stock as practical and shall be kept entirely free from combustible debris.

##### 4.5.2 Waste Cans

When waste or rags are used in connection with dipping operations, approved metal waste cans shall be provided and all impregnated cans or waste deposited therein immediately after use. The contents of waste cans shall be properly disposed of at least once daily at the end of each shift.

##### 4.5.3 Inspection Regularly scheduled inspection or tests of all dip tank facilities shall be made, including covers, overflow pipe inlets and discharge, bottom drains and valves, electrical wiring and equipment and grounding connections, ventilating facilities, and all extinguishing equipment. Any defects found shall be promptly corrected.

##### 4.5.4 Warning Signs

“No Smoking” signs in large letters on contrasting colour background shall be conspicuously posted in the vicinity of dip tanks.

#### 4.6 Extinguishment

##### 4.6.1 Extinguishers Areas in the vicinity of dip tanks shall be provided with manual fire extinguishers suitable for flammable and combustible liquid fires.

##### 4.6.2 Automatic Water Spray Extinguishing Systems Such systems shall conform to the Gulf Standard mentioned in item 2.4 and shall be arranged to protect tanks, drainboards, and stock over drainboards.

##### 4.6.3 Automatic Foam Extinguishing System Automatic foam extinguishing systems shall conform to the Gulf Standard mentioned in item 2.4 and to the following:

##### 4.6.3.1 Foam producing material selected shall be suitable for intended use, taking into account characteristics of the dip tank liquid;

- 4.6.3.2 Overflow pipe shall be arranged to prevent the floating away of foam and clogging overflow pipe. This may be accomplished by either of the following:
- 4.6.3.3 Overflow pipe may be extended through tank wall and terminated in an ell pointing downward. The bottom of the overflow pipe at the point it pierces tank wall should not be over 50 mm above the opening or face of the ell.
- 4.6.3.4 Overflow pipe inlet may be provided with a removable screen of 6 mm mesh having an area at least twice the cross-sectional area of overflow pipe. Screens which may be clogged by dip tank ingredients shall be inspected and cleaned on a regular schedule.
- 4.6.4 Automatic Carbon Dioxide Systems
- Automatic carbon dioxide systems shall be arranged to protect both dip tanks and drainboards and unless stock over drainboards are otherwise protected, automatic extinguishing facilities shall also be arranged to protect such stock. The system shall conform to the Gulf Standard mentioned in item 2.4.
- 4.6.5 Dry Chemical Extinguishing Systems
- Dry chemical extinguishing systems shall be arranged to protect both dip tanks and drainboards, and unless stock over drainboards are otherwise protected, automatic extinguishing facilities shall also be arranged to protect such stock. The system shall conform to the Gulf Standard mentioned in item 2.4.
- 4.6.6 Dip Tank Covers
- Covers arranged to close automatically in the event of fire shall be actuated by automatic devices and shall also be arranged for manual operation.
- 4.6.6.1 Covers shall be of noncombustible material or of metal-clad type with enclosing metal applied with locked joints.
- 4.6.6.2 Chains or wire rope shall be used for cover support or operating mechanism where the burning of a cord would interfere with the action of a device.
- 4.6.6.3 Covers shall be kept closed when tanks are not in use.
- 4.7 Special Dip Tank Applications
- 4.7.1 Hardening and Tempering Tanks
- Tanks shall be located as far as practicable from furnances and shall not be located on or near combustible floors.
- 4.7.1.1 Tanks shall be provided with a noncombustible hood and vent or other equally effective means of venting to the outside of the building to serve . as a vent in case of fire. All such vent ducts shall be treated as flues and be kept well away from combustible roofs or materials.
- 4.7.1.2 Tanks shall be so designed that the maximum workload is incapable of raising the temperature of the cooling medium to within 30'C below its flash point, or such tanks shall be equipped with circulating cooling systems which will accomplish the same result.
- 4.7.1.3 Tanks shall be equipped with a high temperature limit switch arranged to sound an alarm when the temperature of the quenching medium reaches within 30'C below

the flash point. If practical from an operating standpoint, such limit switches shall also shut down conveying equipment supply work to the tank.

- 4.7.1.4 The provisions of item 4.2.5 shall apply to tanks having a liquid surface area of 2.3 sq m or more or a capacity of 1900 litres or more.
- 4.7.1.5 Air under pressure shall not be used to fill or to agitate oil tanks.
- 4.7.1.6 Drain facilities from the bottom of the tank may be combined with the oil circulating system or arranged independently to drain the oil to a safe location. The drain valve shall be operated automatically with approved heat actuated devices or manually, and if the latter, the valve shall be operated from a safe distance.
- 4.7.2 Flow Coat; General Except as modified in this item, all of the preceding standards for dip tanks apply.
  - 4.7.2.1 All piping shall be strongly erected and rigidly supported.
  - 4.7.2.2 Paint shall be supplied by direct low-pressure pumping arranged to automatically shut down by means of heat actuated devices, in the case of fire, or paint may be supplied by a gravity tank not exceeding 40 litres in capacity.
  - 4.7.2.3 The area of the sump and any areas on which paint flows should be considered the area of dip tank.
- 4.7.3 Electrostatic Apparatus; General Installation and use of electrostatic detearing (removing drops of liquid draining off a coated object) equipment shall conform to items 3 through 4.6.
  - 4.7.3.1 Electrostatic apparatus and devices used in connection with paint detearing operations shall be of Standardization & Metrology Organization for GCC Countries approved types.
  - 4.7.3.2 Transformers, powerpacks, control apparatus and all other electrical portions of the equipment, with the exception of high voltage grids and their connections, shall be located outside the vapour area or shall conform to the requirements of item 4.4.
  - 4.7.3.3 Electrodes shall be of substantial construction, rigidly supported in permanent locations and effectively insulated from ground.
  - 4.7.3.4 Insulators shall be nonporous and noncombustible.
  - 4.7.3.5 High voltage leads to electrodes shall be effectively and permanently supported on suitable insulators, and shall be effectively guarded against accidental contact or grounding. An automatic means shall be provided for grounding and discharging any accumulated residual charge on the electrode assembly or the secondary circuit of the high voltage transformer when the primary transformer is disconnected from the source of supply.
  - 4.7.3.6 A space shall be maintained between goods being deteared and electrodes or conductors of at least twice the sparking distance. A suitable sign stating the sparking distance shall be conspicuously posted near the assembly. Goods being deteared using this electrostatic process are to be supported on conveyors. The conveyors shall be so arranged as to maintain safe distances between the goods

and the electrodes at all times. All goods shall be so supported as to prevent any swinging or movement which would reduce the clearance to less than specified in the above item.

- 4.7.3.7 This electrostatic process is not approved where goods being deteared are manipulated by hand.
- 4.7.3.8 Electrostatic apparatus shall be equipped with automatic controls which will operate without time delay to disconnect the power supply to the high voltage transformer and to signal the operator under any of the following conditions.
- 4.7.3.9 Stoppage of ventilating fans or failure of ventilating equipment due to any cause.
- 4.7.3.10 Stoppage of the conveyor carrying goods past the high voltage grid.
- 4.7.3.11 Occurrence of a ground or of an imminent ground at any point on the high voltage system.
- 4.7.3.12 Adequate fencing, railings, or guards shall be so placed about the equipment that they, either by their location or character or both, assure that a safe isolation of the process is maintained from plant storage or personnel. Such railings, fencing and guards shall be of conducting material, adequately ground, and should be at least 1.5 m from processing equipment.
- 4.7.3.13 Electrode insulators shall be kept clean and dry.
- 4.7.3.14 The detearing area shall be ventilated by exhausting adequate air from the area as specified in item 4.1 -
- 4.7.3.15 All area for detearing shall be protected by automatic sprinklers where this protection is available. Where this protection is not available, other automatic extinguishing equipment shall be provided.
- 4.7.3.16 Drip plates and screens subject to paint deposits shall be removable and shall be taken to a safe place for cleaning.

#### 4.7.4 Roll Coating

The processes of roll coating, spreading, and impregnating, in which fabrics, paper, or other materials are passed directly through a tank containing flammable or combustible liquids, or over the surface of a roller that revolves partially submerged in a Class 1 or Class 2 liquid, which are defined in the Gulf Standard mentioned in item 2.2, shall conform to the applicable requirements of items 3 through 4.6 and the following:

Adequate arrangements shall be made to prevent sparks from static electricity by electrically bonding and grounding all metallic rotating and other parts of machinery and equipment and by the installation of static collectors or maintaining a conductive atmosphere such as a high relative humidity.